LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Sept. 6-9, 2011.

9/11 | ANSWERING THE CALL

The Lab's Mike Carter, center, talks with first responders at ground zero days after the 9/11 attacks.

Ten years ago, in the wake of the worst terrorist attacks on American soil, dozens of Laboratory employees were directly involved in the nation's response on Sept. 11, 2001 and in the days and weeks that followed.

Within hours of the attacks, phone calls streamed into the Laboratory from across the federal government with requests for assessments and analyses, for experts and equipment. In addition, Lab people came forward with novel ideas and offers to help, both in the immediate aftermath and in the longer-term war on terrorism.

More than 60 Laboratory employees in a dozen different groups were deployed to New York City, Florida, Washington, D.C. and other locations. People on and off site worked around the clock for weeks, as the nation's defense policy changed.
To read more, go to the Web.

KGO NEWSTALK AM810 | RIGHT IN FRONT OF US

New York City Department of Public Health officers accompany a Department of Energy employee retrieving air samples from a sensor located near the former World Trade Center. Air samples are tested by Livermore technicians at a nearby laboratory.

Devices that can detect biological agents in the atmosphere might be right before our very eyes.

KGO Radio recently interviewed David Rakestraw, a Laboratory Global Security program manager, who discussed how the Lab has dispersed systems that can detect biological threat agents in communities throughout the United States. He said that if a biological attack occurred, these early detection systems could lead to saving lives by treating the symptoms quickly.

One such system is the Biological Aerosol Sentry and Information System, or BASIS, which originally was developed to detect airborn biological pathogens for special events, such as major sporting events or political conventions. It's now located in major metropolitan areas around the nation.

"When 9/11 came we had the capability started and ready to deploy," Rakestraw said.

Other detectors have been deployed in airports and ports to identify radiological weapons.

To listen to the full interview, go here.

A device that can quickly and inexpensively identify viruses is being developed by researchers at the Laboratory and the University of California, Irvine (UCI).

Zuzanna Siwy, UCI physicist, says the key element of their device is a membrane that serves as a barrier; there is one opening called a nanopore, in which things can pass through.

This membrane is placed between two cartridges filled with a solution of salt. Using current from a battery, the salt passes through the nanopore, creating a signal that can be measured.

Imagine that you have a virus in the solution as well. The virus will want to pass through the nanopore but is much larger than the constituents of the salt. So even a single virus will cause obstruction of the nanopore leading to quicker detection.

To hear the full interview, go to the Web.

DATA CENTER KNOWLEDGE

FROM TERAFLOPS TO PETAFLOPS

The Dawn supercomputer at the Laboratory is an IBM Blue Gene/P system that will pave the way for Sequoia, the 20-petaflop Blue Gene/Q system at LLNL.

IBM recently lifted the curtain on its Blue Gene/Q SoC and noted that it will soon be installed in two of the most powerful Blue Gene systems ever deployed.

IBM is working with two Department of Energy labs for a 10-petaflop Mira system at Argonne National Lab and the 20-petaflop Sequoia at Lawrence Livermore. The current top supercomputer in the world, the Japanese K, can sustain 8.162 petaflops.

The Blue Gene/Q SoC will pull 204 gigaflops per processor, with an 18 core count, and consumes 55 watts at peak. With a significant increase in performance, the Blue Gene/Q chip delivers 15 times as many peak FLOPS as its Blue Gene/P counterpart and 36 times as many as the original Blue Gene/L SoC.

Sequoia is set to go online in 2012.

To read more, go to the Web.

FEEL THE HEAT

Nuclear power plants use water to generate electricity. Steam is used to drive a turbine to produce power. The exhaust steam is cooled and the cooling results in the exhaust of waste heat through a cooling tower.

Lawrence Livermore estimates that 55 percent of all the energy generated in the United States in 2009 was lost to waste heat, suggesting that a much wider range of applications is necessary. Previous efforts to produce power from waste heat have achieved only 2 percent efficiency.

That's where scientists at Oak Ridge National Laboratory come in. They have successfully developed a new method for generating electricity from waste heat. The technology, which scientists believe could achieve efficiencies of 10 percent to 30 percent, relies on pyroelectricity -- the capacity of certain materials to generate temporary voltage when heated or cooled.

Applications for this device -- which measures only a few millimeters long -- may be found in cooling and powering laptops or in converting solar heat absorbed by photovoltaic solar panels, but not used by them.

To read more, go to the Web.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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